Infrared Speckle Interferometry and Spectroscopy of Io

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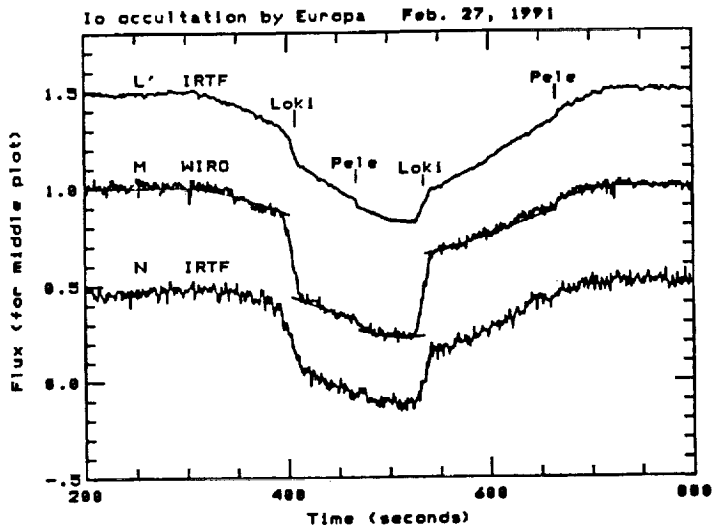

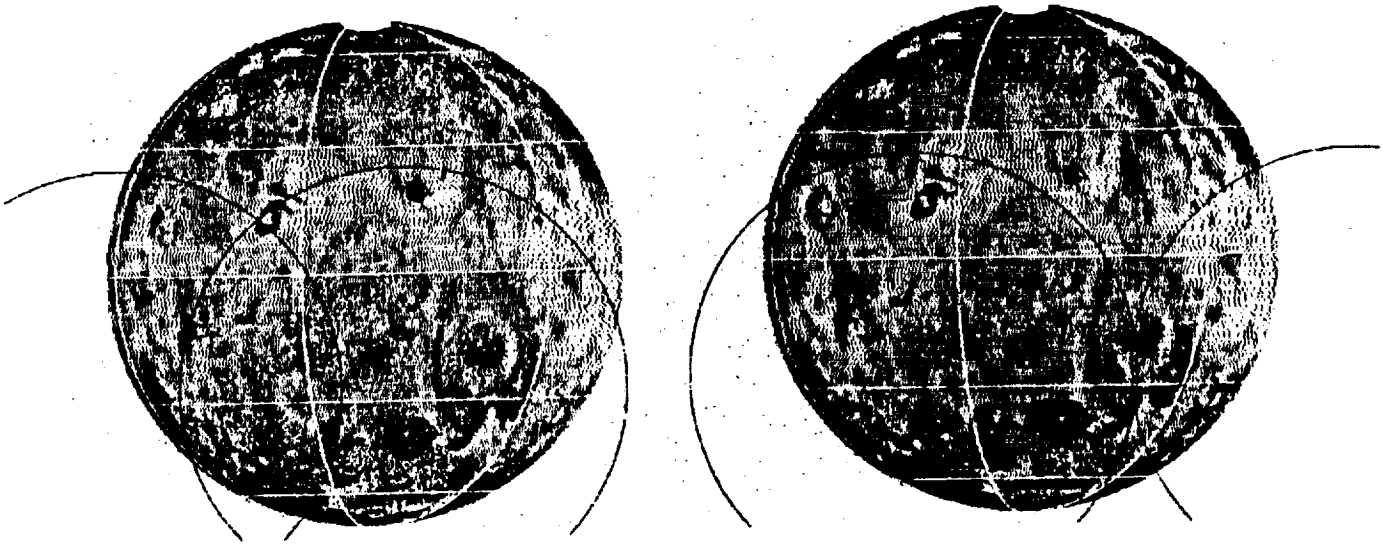

LOKI PELE

Observations of a series of "mutual events" of the Galilean satellites occurring in early 1991 are providing high resolution information concerning the volcanic hot spots on Jupiter's moon Io. In the first figure the brightness of Io is plotted as a function of time, as it is occulted by Europa. The top and bottom curves are shifted vertically by 0.5 for clarity. The sharp jumps in the curves are caused by volcanic hotspots being covered and uncovered. The L' and N (i.e. 3.8 and 10 micron) data were obtained by Jay Goguen and coworkers at IRTF, while the

M (5 micron) data were obtained by Robert Howell at the Wyoming 92" telescope. Both are supported by the NASA Planetary Astronomy program: Goguen -- "1991 Io Occultations by Europa", and Howell -- "Speckle Interferometry and Spectroscopy of Io."

The lower figures are Voyager derived globes of Io, with the positions of Europa at the time of the lightcurve jumps shown by dark circles. The intersections of the circles give the locations of the hot spots. The bright hotspot is located at the dark feature "Loki", while the fainter hotspot is located at "Pele". Loki has been active since the time of Voyager. Pele seems to erupt intermittently.

The sizes and temperatures of the hot spots can also be derived from the lightcurves. Loki takes roughly 13 seconds to disappear and reappear, indicating a diameter of 150 km. Pele is brighter at shorter wavelengths while Loki is brighter at longer wavelengths, therefore Pele is hotter. Analysis of other mutual events in the 1991 series will allow us study the structure in the Loki hot spot, and to check for variability of Pele.